Calibrating Rate Indexing Mechanisms for Third Generation Incentive Regulation in Ontario

Presentation to IRM3 Stakeholders

Larry Kaufmann, *Partner*
Pacific Economics Group

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Introduction

PEG has

- Made preliminary recommendations for X factors for the third generation incentive regulation mechanism (IRM3) in Ontario

- Summarized our recommendations in a Draft Report for OEB Staff

Today's presentation will briefly review those recommendations and report

Organization

1. X Factor Overview

2. Options for Estimating X Factors

3. TFP Estimation
   - Previous IR in Ontario
   - Recent indexing results in Ontario
   - US TFP trends
   - Comparison US and Ontario TFP trends

4. Consumer Dividend Estimation

5. Recommendations

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X Factor Overview

Main objectives for regulatory framework to be established in IRM 3:

- Sustainable
- Predictable
- Effective
- Practical

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X Factor Overview (Con't)

PEG has been guided by these objectives in developing its X factor recommendations

Intention has been to put in place

- Data Sources
- Empirical Tools

That

- Lead to reasonable X factors in IRM3
- Can be easily expanded and revised in future IR applications

>> current approach not set in stone for all future IR- it *should* evolve over time

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X Factor Overview (Con't)

Staff and most of the Working Group think an industry price index (IPI) to measure inflation may be appropriate in IRM3

With an IPI, the X factor is the sum of two components

1. The industry trend in total factor productivity (TFP)
2. A consumer dividend

X Factor Overview (Con't)

PEG has developed recommendations for the productivity factor and a recommended approach for consumer dividends

In each case, we have tried to use data and empirical techniques that

- Lead to reasonable current values
- Provide a sustainable – but flexible – basis for setting future X factors

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X Factor Overview (Con't)

Cost of Service Review: R=C

$$\underbrace{\%\Delta R^{Industry}}_{\text{Revenue}} = \underbrace{\%\Delta Y^{Industry}}_{\text{Output Quantity}} + \underbrace{\%\Delta P^{Industry}}_{\text{Output Price}}$$

$$\underbrace{\%\Delta C^{Industry}}_{\text{Cost}} = \underbrace{\%\Delta X^{Industry}}_{\text{Input Quantity}} + \underbrace{\%\Delta W^{Industry}}_{\text{Input Price}}$$

$$\%\Delta R^{Industry} = \%\Delta C^{Industry}$$

$$\Rightarrow \%\Delta P^{I} = \%\Delta W^{I} - (\%\Delta Y^{I} - \%\Delta X^{I})$$

Inflation factor (P) X factor (X)

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X Factor Overview(Con't)

Most X-factors in approved *North American* price cap plans are *calibrated* to track industry total factor productivity TFP trend

Total Factor Productivity

TFP = Output/Input

TFP Growth = Changes in Output Quantity minus Changes in Input Quantity

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X Factor Options

Two main methods can be used to estimate Total Factor Productivity (TFP) and calibrate X factors

1. Index-based Methods

2. Econometric Methods

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X Factor Options (Con't)

Indexing methods compute measures of comprehensive output quantities (Y) and input quantities (X)

Change in TFP (ΔTFP) is then computed as

$$\Delta TFP = \Delta Y - \Delta X$$

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X Factor Options (Con't)

Output quantity a weighted average of:

- Customer Numbers
- kWh deliveries
- kW demand (if available and accurate)

Revenue shares should be used to weight output quantity subindexes but are often unavailable

Cost elasticity shares are a second best, feasible alternative for output weights

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X Factor Options (Con't)

Input quantity a weighted average of:

- Labor inputs (if available)
- Other OM&A inputs
- Capital inputs

Changes in input quantity measured as changes in expenditure on the input minus the change in the associated input price subindex

>> input price indices constructed at same time as TFP indexes

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X Factor Options (Con't)

Index-based approaches to TFP measurement

<u>Pros</u>

- Relatively simple
- Requires less cross sectional data
- Relies on well established techniques
- Relatively well understood and transparent

<u>Cons</u>

- May not reflect diversity among distributors
- Will not necessarily yield reliable estimates of <u>future</u> TFP trends if business conditions in future differ from the past
- Requires relatively extensive <u>time series</u> data, usually at least 10 years

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X Factor Options (Con't)

Econometric techniques can also be used to decompose TFP growth into its various components

- Time trend/technological change
- Realization of economies of scale
- Changes in business conditions
  - Changes in customer density
  - Changes in undergrounding
  - System age and investment requirements
- Changes in the efficiency of operations

X Factor Options (Con't)

Estimated impact of various "TFP drivers" can be used to project TFP growth going forward given estimates of expected quantitative changes in those TFP drivers

Precedents

- TFP Decomposition in California
- Ontario Gas IR
- Victoria gas rate review (PFP)

PEG also presented TFP decomposition results for the power distribution industry in Victoria

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X Factor Options (Con't)

Example

$$T\dot{F}P = \hat{a}_0 + \hat{a}_1\dot{N} + \hat{a}_2\dot{V} + \hat{a}_3\dot{U}G + \hat{a}_4 time$$

→ coefficients estimated from total cost function

→ reflect underlying impact of "driver" variables on TFP growth

For company *j*

$$T\dot{F}P_j = \hat{a}_0 + \hat{a}_1\dot{N}_j + \hat{a}_2\dot{V}_j + \hat{a}_3\dot{U}G_j + \hat{a}_4 time$$

>> TFP projection tailored for values of individual driver variables of company *j*

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X Factor Options (Con't)

Econometric approaches to TFP measurement

<u>Pros</u>

- Can reflect diversity in distributor business conditions
- Can capture differences in future business conditions compared with past
- Does not require as extensive time series data

<u>Cons</u>

- More complex
- More cross sectional data typically required
- Techniques and results less well understood

X Factor Options (Con't)

PEG ultimately decided to use indexing methods to estimate TFP

- Better understanding among stakeholders
- Easier to review
- More consistent with sustainable IR framework (?)

<u>BUT</u> implementing index-based approach in Ontario was impacted by data constraints on Ontario industry

X Factor Options (Con't)

Consumer dividends often vary by company

>> "company specific" and "future" productivity factor

Consumer dividend values almost always determined through judgment

Approved dividends are between 0 and 1%, with an average value of about 0.5%

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X Factor Options (Con’t)

Benchmarking sometimes used to inform judgment

Basic ideas:

Relatively less efficient company →

More fat to cut →

Greater scope for incremental TFP gains →

Higher consumer dividend

And vice versa

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X Factor Options (Con't)

Some examples:

- Massachusetts: econometric benchmarking
- New Zealand: productivity level benchmarks

Benchmarking also used extensively to set "stretch" goals overseas, but the paradigm(s) are different, so don't set consumer dividends *per se*

X Factor Options (Con't)

Given uncertainty with benchmarking, it is often better if regulation does not establish a direct, mechanistic link between benchmarking results and consumer dividend

>> puts too much weight on getting the value of benchmarking evaluation exactly "right"

But it is appropriate to use rigorous benchmarking results to inform values of consumer dividends

- "good" benchmarking evaluation → relatively lower consumer dividend
- "bad" benchmarking evaluation → relatively high consumer dividend

TFP Estimation

Estimation of Industry TFP Trends

PEG considered three sources of information for setting industry TFP trends

1. TFP Estimation from previous IR applications in Ontario
2. Recent index-based TFP measures for Ontario industry
3. Recent index-based TFP measures for US industry

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TFP Estimation (Con't)

Previous TFP Estimation from Ontario

In IRM1, Cronin and King estimated TFP trends for 48 Ontario electricity distributors for the 1988-97 period

Average TFP growth over period = 0.86%

Average TFP growth over second half of period = 2.05%

Board put more weight on second half TFP growth and approved a TFP trend of 1.25% (=2/3*0.86% + 1/3*2.05%)

Table 1

Estimated TFP Growth in First Generation IRM

Entire Sample: 1988-97

Size Class	Output Quantity Growth	Input Quantity Growth	TFP Growth
Small	0.84%	0.27%	0.57%
Medium	2.05%	1.04%	1.01%
Large	1.08%	0.16%	0.92%
All Utilities	1.40%	0.54%	**0.86%**

"First Half" of Sample Period: 1988-93

Size Class	Output Quantity Growth	Input Quantity Growth	TFP Growth
Small	1.30%	1.77%	-0.45%
Medium	2.91%	2.59%	0.31%
Large	1.38%	1.66%	-0.28%
All Utilities	1.97%	2.06%	**-0.09%**

"Second Half" of Sample Period: 1993-97

Size Class	Output Quantity Growth	Input Quantity Growth	TFP Growth
Small	0.26%	-1.60%	1.85%
Medium	0.98%	-0.90%	1.89%
Large	0.71%	-1.71%	2.42%
All Utilities	0.69%	-1.36%	**2.05%**

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TFP Estimation (Con't)

Previous TFP Estimation from Ontario

In IRM 2, the X factor was set equal to 1%

Determined through judgment and overall view of evidence and precedents from other proceedings

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TFP Estimation (Con't)

Current TFP Measures in Ontario

PEG also estimated recent TFP trends for Ontario industry

High quality data available only since 2002

Data sources are RRR filings

Estimated capital stock for 2002 using reported book data and imputations on previous capital additions 1992-2002

TFP Estimation (Con't)

<u>Current TFP Measures in Ontario</u>

Output growth is a weighted average growth in

- Customer numbers
- kWh deliveries (weather normalized for residential customers)

Cost elasticity shares served as weights

TFP Estimation (Con't)

WEATHER-NORMALIZATION MODEL OF RESIDENTIAL VOLUMES FOR POWER DISTRIBUTION

VARIABLE KEY

HDD = Heating Degree Days
N = Number Of Residential Customers

EXPLANATORY VARIABLE	PARAMETER ESTIMATE	T-STATISTIC		
HDD	0.149	3.51	Rbar-Squared	0.988
N	0.982	169.84	Number of Observations	384
Constant	8.127	21.88		

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TFP Estimation (Con't)

Input quantity growth a weighted average of growth in:

- Capital additions
- Deflated OM&A

Cost shares served as weights

Input price indexes:

- Capital: Cost of Service Capital Service Price Index
- OM&A: GDP-IPI FDD

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Table 3

OUTPUT QUANTITY GROWTH: ONTARIO POWER DISTRIBUTORS

Year	Output Quantity		Customers		Volume	
	Index	Growth Rate	Index	Growth Rate	Index	Growth Rate
2002	1.00000		1.00000		1.00000	
2003	1.03055	3.01%	1.01996	1.98%	1.04883	4.77%
2004	1.04165	1.07%	1.03657	1.62%	1.05035	0.14%
2005	1.06892	2.58%	1.05081	1.36%	1.10048	4.66%
2006	1.06545	-0.33%	1.06398	1.25%	1.06795	-3.00%
Average Annual Growth Rate **2002-2006**		**1.58%**		**1.55%**		**1.64%**

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Table 4

INPUT QUANTITY GROWTH: ONTARIO POWER DISTRIBUTORS

Year	Input Quantity		OM&A		Capital	
	Index	Growth Rate	Index	Growth Rate	Index	Growth Rate
2002	1.00000		1.00000		1.00000	
2003	1.01113	1.11%	1.01181	1.17%	1.01065	1.06%
2004	1.01006	-0.11%	0.98394	-2.79%	1.02535	1.44%
2005	1.04058	2.98%	1.03910	5.45%	1.04189	1.60%
2006	1.06516	2.33%	1.05646	1.66%	1.07049	2.71%
Average Annual Growth Rate **2002-2006**		**1.58%**		**1.37%**		**1.70%**

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Table 6

PRODUCTIVITY RESULTS: ONTARIO POWER DISTRIBUTORS

Year	Output Quantity		Input Quantity		TFP	
	Index	**Growth Rate**	**Index**	**Growth Rate**	**Index**	**Growth Rate**
2002	1.000		1.000		1.000	
2003	1.031	3.01%	1.011	1.11%	1.019	1.90%
2004	1.042	1.07%	1.010	-0.11%	1.031	1.18%
2005	1.069	2.58%	1.041	2.98%	1.027	-0.39%
2006	1.065	-0.33%	1.065	2.33%	1.000	-2.66%
Average Annual Growth Rate **2002-2006**		**1.58%**		**1.58%**		**0.01%**

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TFP Estimation (Con't)

<u>TFP Results</u>

Results show that TFP was essentially flat between 2002 and 2006

However, PEG believes current data limitations reduce the accuracy and reliability of these TFP trends

TFP Estimation (Con’t)

<u>US Index-based TFP Trends</u>

PEG also estimated TFP trends for US industry

Similar methods as for Ontario although:

- Three inputs (data exists on labor – non-labor split of OM&A)
- 1964 benchmark value for capital stock

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Table 7

SAMPLED POWER DISTRIBUTORS FOR TFP TREND RESEARCH

Alabama Power
Appalachian Power
Arizona Public Service
Atlantic City Electric
Avista
Baltimore Gas & Electric
Black Hills Power
Boston Edison
Carolina Power & Light
Central Hudson Gas & Electric
Central Illinois Light
Central Maine Power
Central Vermont Public Service
Cincinnati Gas & Electric
CLECO
Cleveland Electric Illuminating
Columbus Southern Power
Duke Power
Edison Sault Electric
El Paso Electric
Empire District Electric
Florida Power & Light
Florida Power
Idaho Power
Kansas City Power & Light
Kansas Gas & Electric
Kentucky Power
Kentucky Utilities
Kingsport Power
Louisville Gas and Electric
Madison Gas and Electric
Maine Public Service
Mississippi Power
Mount Carmel Public Utility
Nevada Power
Northern Indiana Public Service
Northern States Power
Ohio Edison
Ohio Power
Oklahoma Gas and Electric
Orange and Rockland Utilities
Otter Tail Power
Pacific Gas & Electric
PacifiCorp
Potomac Edison
Potomac Electric Power
PSI Energy
Public Service of Colorado
Public Service of New Hampshire
Public Service of Oklahoma
Public Service Electric & Gas
Rochester Gas and Electric
San Diego Gas & Electric
South Carolina Electric & Gas
Southern California Edison
Southern Indiana Gas & Electric
Southwestern Electric Power
Southwestern Public Service
Tampa Electric
Toledo Edison
Tuscon Electric Power
Union Light Heat & Power
United Illuminating
Virginia Electric & Power
West Penn Power
Western Massachusetts Electric
Wisconsin Electric Power
Wisconsin Power and Light
Wisconsin Public Service

Number of Companies: 69

Table 8

OUTPUT QUANTITY INDEXES: U.S. SAMPLE

	Summary	Quantity Subindexes	
Year	**Index**	**Customer Numbers**	**Deliveries**
1988	1.000	1.000	1.000
1989	1.040	1.037	1.046
1990	1.060	1.057	1.066
1991	1.077	1.071	1.087
1992	1.089	1.085	1.094
1993	1.111	1.100	1.130
1994	1.131	1.116	1.155
1995	1.152	1.133	1.184
1996	1.171	1.148	1.211
1997	1.190	1.168	1.229
1998	1.213	1.185	1.262
1999	1.233	1.204	1.285
2000	1.260	1.224	1.322
2001	1.272	1.244	1.322
2002	1.291	1.259	1.346
2003	1.309	1.278	1.364
2004	1.333	1.298	1.395
2005	1.357	1.316	1.429
2006	1.371	1.337	1.430
Average Annual Growth Rate **1988-2006**	**1.75%**	**1.61%**	**1.99%**

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Table 9

INPUT QUANTITY INDEXES: U.S. SAMPLE

Year	Summary Index	Input Quantity Subindexes: Labor	Materials & Services	Capital
1988	1.000	1.000	1.000	1.000
1989	1.020	1.003	1.020	1.026
1990	1.037	0.988	1.049	1.049
1991	1.064	0.988	1.118	1.071
1992	1.068	0.978	1.090	1.090
1993	1.106	1.003	1.191	1.108
1994	1.114	0.948	1.255	1.123
1995	1.115	0.918	1.258	1.135
1996	1.128	0.908	1.314	1.144
1997	1.123	0.846	1.336	1.154
1998	1.145	0.837	1.437	1.164
1999	1.157	0.841	1.455	1.177
2000	1.158	0.813	1.470	1.185
2001	1.150	0.771	1.448	1.195
2002	1.153	0.747	1.483	1.202
2003	1.181	0.769	1.558	1.216
2004	1.173	0.753	1.510	1.224
2005	1.191	0.772	1.560	1.232
2006	1.205	0.797	1.586	1.237
Average Annual Growth Rate **1988-2006**	**1.04%**	**-1.26%**	**2.56%**	**1.18%**

Table 10

INPUT PRICE INDEXES: U.S. SAMPLE

Year	Summary Index	Input Quantity Subindexes: Labor	Input Quantity Subindexes: Materials & Services	Input Quantity Subindexes: Capital
1988	1.000	1.000	1.000	1.000
1989	1.051	1.043	1.038	1.058
1990	1.100	1.094	1.078	1.110
1991	1.151	1.141	1.115	1.168
1992	1.180	1.182	1.141	1.194
1993	1.230	1.224	1.167	1.258
1994	1.368	1.263	1.191	1.478
1995	1.420	1.297	1.216	1.548
1996	1.453	1.335	1.238	1.584
1997	1.488	1.377	1.259	1.623
1998	1.485	1.427	1.273	1.596
1999	1.575	1.473	1.291	1.731
2000	1.501	1.539	1.319	1.568
2001	1.414	1.603	1.351	1.389
2002	1.474	1.659	1.374	1.469
2003	1.607	1.720	1.403	1.669
2004	1.644	1.787	1.443	1.698
2005	1.798	1.841	1.489	1.927
2006	1.925	1.893	1.536	2.111
Average Annual Growth Rate **1988-2006**	**3.64%**	**3.54%**	**2.38%**	**4.15%**

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Table 11

PRODUCTIVITY RESULTS: U.S. SAMPLE

Year	Output Quantity Index	Input Quantity Index	TFP Index
1988	1.000	1.000	1.000
1989	1.040	1.020	1.020
1990	1.060	1.037	1.022
1991	1.077	1.064	1.012
1992	1.089	1.068	1.020
1993	1.111	1.106	1.005
1994	1.131	1.114	1.015
1995	1.152	1.115	1.033
1996	1.171	1.128	1.038
1997	1.190	1.123	1.060
1998	1.213	1.145	1.060
1999	1.233	1.157	1.066
2000	1.260	1.158	1.088
2001	1.272	1.150	1.107
2002	1.291	1.153	1.119
2003	1.309	1.181	1.109
2004	1.333	1.173	1.136
2005	1.357	1.191	1.139
2006	1.371	1.205	1.138
Average Annual Growth Rate **1988-2006**	**1.75%**	**1.04%**	**0.72%**

TFP Estimation (Con't)

PEG also compared US and Ontario TFP growth

Necessary to make some assumptions about Ontario TFP growth during 1997-2002 "missing years"

PEG considered four scenarios

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Table 12

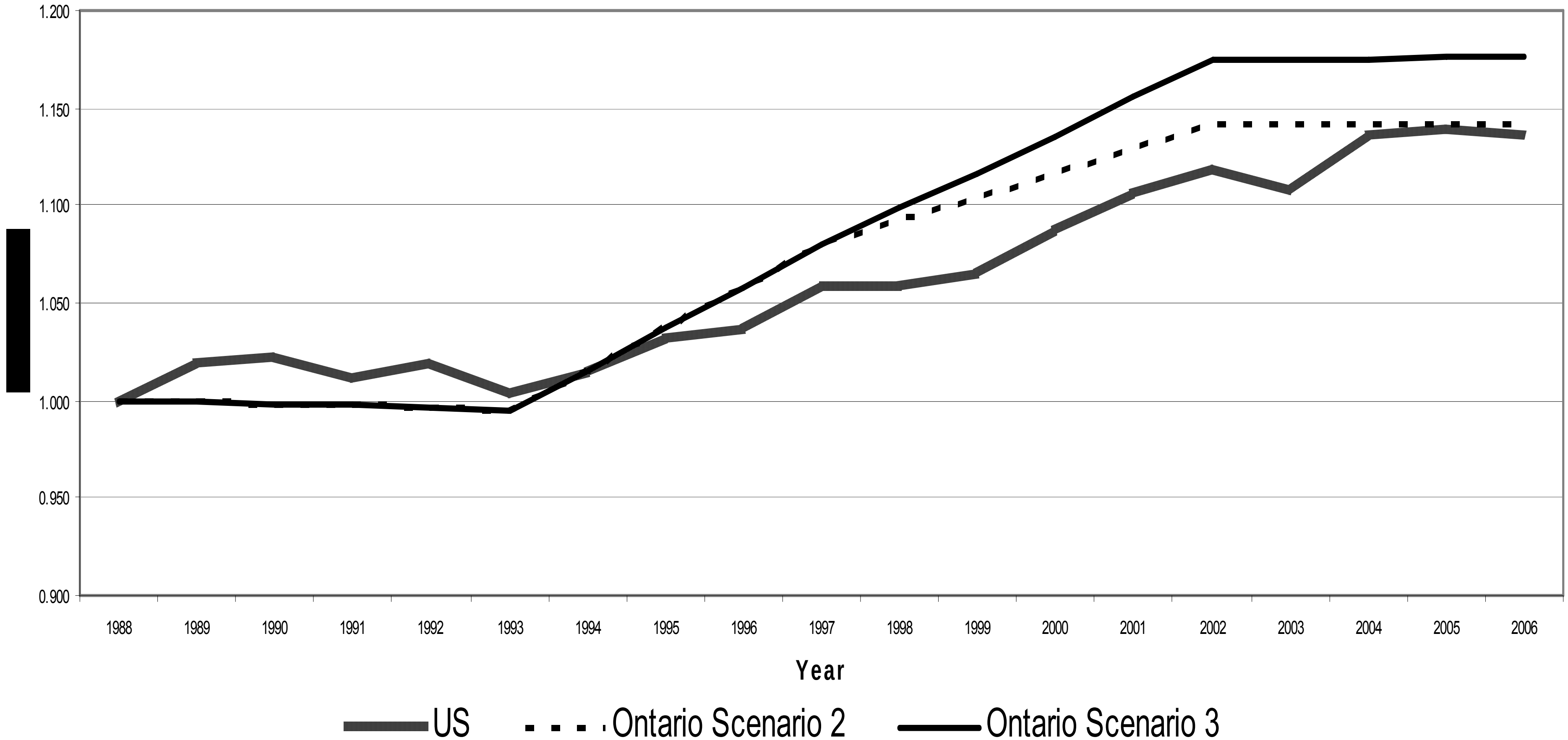
Comparison of US and Ontario Electricity Distribution TFP Growth

	TFP Growth				
	Ontario 1 [a]	Ontario 2 [b]	Ontario 3 [c]	Ontario 4 [d]	United States
1988	1.000	1.000	1.000	1.000	1.000
1989	0.999	0.999	0.999	0.999	1.020
1990	0.998	0.998	0.998	0.998	1.022
1991	0.997	0.997	0.997	0.997	1.012
1992	0.996	0.996	0.996	0.996	1.020
1993	0.995	0.995	0.995	0.995	1.005
1994	1.016	1.016	1.016	1.016	1.015
1995	1.037	1.037	1.037	1.037	1.033
1996	1.059	1.059	1.059	1.059	1.038
1997	1.080	1.080	1.080	1.080	1.060
1998	1.080	1.092	1.099	1.103	1.060
1999	1.080	1.104	1.117	1.126	1.066
2000	1.080	1.116	1.136	1.149	1.088
2001	1.080	1.129	1.156	1.173	1.107
2002	1.080	1.141	1.175	1.197	1.119
2003	1.081	1.141	1.175	1.197	1.109
2004	1.081	1.141	1.175	1.197	1.136
2005	1.081	1.141	1.176	1.197	1.139
2006	1.081	1.141	1.176	1.198	1.138
1988 - 2006	0.43%	0.74%	0.90%	1.00%	0.72%
1988 - 1993	-0.09%	-0.09%	-0.09%	-0.09%	0.09%
1993 - 1997	2.05%	2.05%	2.05%	2.05%	1.33%
1997 - 2002	0.00%	1.09%	1.68%	2.05%	1.09%
2002 - 2006	0.01%	0.01%	0.01%	0.01%	0.41%

	Difference between Ontario and US TFP Growth Rates			
	Ontario 1 [a]	Ontario 2 [b]	Ontario 3 [c]	Ontario 4 [d]
1988 - 2006	-0.28%	0.02%	0.18%	0.29%
1988 - 1993	-0.19%	-0.19%	-0.19%	-0.19%
1993 - 1997	0.72%	0.72%	0.72%	0.72%
1997 - 2002	-1.09%	0.00%	0.58%	0.96%
2002 - 2006	-0.40%	-0.40%	-0.40%	-0.40%

[a] Assumes 0% TFP growth 1997 - 2002.
[b] Assumes Ontario TFP growth equal to US TFP growth 1997 - 2002.
[c] Assumes Ontario TFP growth 1997 - 2002 maintains proportion relative to US TFP growth from 1993 - 1997.
[d] Assumes TFP growth 1997 - 2002 matches 2.05% rate as in 1993 - 1997.

Comparative TFP Experience
US and Ontario Power Distributors



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TFP Estimation (Con't)

PEG believes data show US TFP growth a reasonable proxy for Ontario

TFP trend estimated over 1995-2006 period based on our "start date analysis"

This TFP trend – and recommended productivity factor for IRM3 – is 0.88% pa

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Table 13

Start Date Analysis for Determining Long Run TFP Trend

Year	Heating Degree Days	Cooling Degree Days	Unemployment Rate	% Difference from 2006 Conditions
1990	4,016	1,260	5.6	-1.44%
1991	4,200	1,331	6.9	-1.62%
1992	4,441	1,040	7.5	-3.07%
1993	4,700	1,218	6.9	-1.72%
1994	4,483	1,220	6.1	-1.50%
1995	4,531	1,293	5.6	-0.87%
1996	4,713	1,180	5.4	-1.13%
1997	4,542	1,156	4.9	-1.08%
1998	3,951	1,410	4.5	-0.18%
1999	4,169	1,297	4.2	-0.25%
2000	4,460	1,229	4.0	-0.17%
2001	4,223	1,245	4.7	-0.79%
2002	4,284	1,393	5.8	-0.75%
2003	4,460	1,290	6.0	-1.15%
2004	4,224	1,260	5.5	-1.20%
2005	4,290	1,232	5.1	-1.02%
2006	4,315	1,397	4.6	0.00%

Coefficients	lhdd	lcdd	lur
Parameters	0.0352	0.0563	-0.0309
T-statistic	5.0607	7.6498	-1.8291

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Estimation Consumer Dividend

PEG will look to econometric and index-based benchmarking results to inform values of consumer dividends

In both cases, starting point was PEG's previous comparative cost analysis for OM&A costs

>> has been updated, final results will be used as basis for consumer dividends

Econometric cost model used simple double-log cost form for benchmarking

Econometric Model of OM&A Expenses: Double Log Form

VARIABLE KEY

WL= Labour Price
N= Number Retail Customers
V= Retail Deliveries
M= Distribution Line Circuit Kilometers
F= % Forestation of Rural Service Territory
UN= Percent of Distribution Plant that is Underground
CS= Canadian Shield (binary)
NCT= Non-Contiguous Service Territory (binary)

EXPLANATORY VARIABLE	PARAMETER ESTIMATE	T-STATISTIC	EXPLANATORY VARIABLE	PARAMETER ESTIMATE	T-STATISTIC
WL	0.794	4.835	**F**	0.014	2.992
N	0.643	20.738	**UN**	-0.059	-5.833
V	0.142	4.911	**CS**	0.015	3.522
M	0.140	8.871	**NCT**	0.004	1.650
Constant	15.788	2081.988			

Other Results

System Rbar-Squared	0.977
Sample Period	2002-2005
Number of Observations	324

Pacific Economics Group, LLC
Economic and Litigation Consulting

Econometric Model of OM&A Expenses: Translog Form

VARIABLE KEY

WL= Labour Price
N= Number Retail Customers
V= Retail Deliveries
M= Distribution Line Circuit Kilometers
UN= Percent of Distribution Plant that is Underground
CS= Canadian Shield (binary)

EXPLANATORY VARIABLE	PARAMETER ESTIMATE	T-STATISTIC
WL	1.124	4.544
WLWL	4.294	0.522
WLN	-3.727	-3.288
WLV	5.356	5.707
WLM	-2.423	-5.739
N	0.576	14.465
NN	-0.246	-0.957
V	0.224	6.307
VV	-0.208	-1.314

EXPLANATORY VARIABLE	PARAMETER ESTIMATE	T-STATISTIC
M	0.138	5.385
MM	0.209	4.769
UN	-0.034	-3.216
CS	0.024	5.186
Constant	15.805	1754.127

Other Results

System Rbar-Squared	0.98
Sample Period	2002-2005
Number of Observations	324

Pacific Economics Group, LLC
Economic and Litigation Consulting

Estimation Consumer Dividend (Con't)

PEG also constructed OM&A unit cost subindices

$$\text{Unit Cost} = {}^{\text{OM\& A cost}}\!\big/_{\text{comprehensive output quantity index}}$$

Company unit cost indexes compared to average unit cost index for each distributor's designated peer group

Companies then ranked in terms of relative efficiency on unit cost indexes (*i.e.* percentage difference between company unit cost index and peer group average unit cost)

Pacific Economics Group, LLC
Economic and Litigation Consulting

Table 16

Effects of Cost Performance: Translog & Double Log Models

		Translog Model					Double Log Model				
	Years Benchmarked	Actual/Predicted [A]	Deviation Percentage [A-1]	P-Value	Excess Cost in $	Rank	Actual/Predicted [A]	Deviation Percentage [A-1]	P-Value	Excess Cost in $	Rank
Hydro 2000	2002-2005	0.686	-0.314	0.096	-74,601	1	0.647	-0.353	0.089	-88,784	1
Hydro One Brampton Networks	2002-2005	0.707	-0.293	0.001	-5,556,551	2	0.757	-0.243	0.012	-4,278,375	9
Hydro Hawkesbury	2002-2005	0.714	-0.286	0.007	-262,382	3	0.654	-0.346	0.000	-346,746	2
Newbury Power	2002-2005	0.717	-0.283	0.110	-16,382	4	0.835	-0.165	0.249	-8,156	16
Hearst Power	2002-2005	0.733	-0.267	0.011	-186,012	5	0.721	-0.279	0.005	-197,236	4
Kitchener-Wilmot Hydro	2002-2005	0.736	-0.264	0.001	-3,356,860	6	0.727	-0.273	0.001	-3,510,160	5
Tay Hydro Electric	2002-2005	0.767	-0.233	0.104	-392,542	7	0.703	-0.297	0.013	-307,747	3
Lakefront Utilities	2002-2004	0.767	-0.233	0.014	-221,328	8	0.819	-0.181	0.131	-286,424	14
Lakeland Power	2002-2005	0.773	-0.227	0.014	-565,560	9	0.820	-0.180	0.046	-422,585	15
Port Colborne (CNP)	2002-2005	0.775	-0.225	0.052	-416,948	10	0.751	-0.249	0.031	-475,272	8
Barrie Hydro	2002-2005	0.789	-0.211	0.054	-2,070,698	11	0.748	-0.252	0.031	-2,627,633	7
Grimsby Power	2002-2005	0.801	-0.199	0.045	-326,436	12	0.735	-0.265	0.006	-473,100	6
Cooperative Hydro Embrun	2002-2005	0.806	-0.194	0.026	-72,437	13	0.886	-0.114	0.167	-38,644	22
Cambridge & North Dumfries	2002-2005	0.811	-0.189	0.024	-1,649,361	14	0.842	-0.158	0.062	-1,331,706	17
Niagara-on-the-Lake Hydro	2002-2005	0.813	-0.187	0.028	-291,049	15	0.817	-0.183	0.042	-283,286	13
Chatham-Kent Hydro	2004-2005	0.818	-0.182	0.021	-1,045,214	16	0.807	-0.193	0.023	-1,131,966	12
Renfrew Hydro	2002-2005	0.827	-0.173	0.046	-150,659	17	0.775	-0.225	0.011	-208,202	11
Orangeville Hydro	2002-2005	0.849	-0.151	0.069	-294,264	18	0.905	-0.095	0.205	-171,832	25
E.L.K. Energy	2002-2005	0.874	-0.126	0.166	-242,263	19	0.937	-0.063	0.282	-114,357	30
Festival Hydro	2002-2005	0.875	-0.125	0.165	-423,298	20	0.878	-0.122	0.134	-409,824	20
Halton Hills Hydro	2002-2005	0.877	-0.123	0.107	-524,215	21	0.849	-0.151	0.093	-663,047	18
Wasaga Distribution	2002-2005	0.906	-0.094	0.158	-133,289	22	0.763	-0.237	0.025	-398,683	10
Fort Frances Power	2002-2005	0.907	-0.093	0.177	-93,677	23	0.863	-0.137	0.099	-144,073	19
Burlington Hydro	2002-2005	0.908	-0.092	0.171	-969,802	24	0.901	-0.099	0.170	-1,043,495	23
Hydro Ottawa	2002-2005	0.917	-0.083	0.096	-3,415,957	25	0.907	-0.093	0.093	-3,869,409	26
Guelph Hydro Electric Systems	2002-2005	0.931	-0.069	0.258	-554,396	26	0.977	-0.023	0.409	-175,301	40
Milton Hydro Distribution	2002-2005	0.934	-0.066	0.232	-85,131	27	0.944	-0.056	0.263	-212,953	31
Kenora Hydro Electric	2002-2005	0.934	-0.066	0.248	-250,934	28	0.950	-0.050	0.318	-63,302	33
St. Thomas Energy	2002-2005	0.940	-0.060	0.285	-159,655	29	0.965	-0.035	0.287	-93,043	35
Ottawa River Power	2002-2004	0.941	-0.059	0.298	-116,515	30	0.984	-0.016	0.358	-29,877	41
Peterborough Distribution	2002-2005	0.943	-0.057	0.280	-310,031	31	0.923	-0.077	0.233	-424,870	27
Oakville Hydro Electricity Distribution	2002-2005	0.947	-0.053	0.260	-511,115	32	0.993	-0.007	0.351	-73,990	42
Powerstream	2002-2005	0.954	-0.046	0.254	-1,610,386	33	0.974	-0.026	0.300	-847,161	37
West Perth Power	2002-2005	0.960	-0.040	0.061	-18,665	34	0.976	-0.024	0.080	-10,833	38
Waterloo North Hydro	2002-2005	0.966	-0.034	0.370	-291,019	35	0.967	-0.033	0.359	-282,562	36
Horizon Utilities	2002-2005	0.968	-0.032	0.252	-1,084,526	36	0.931	-0.069	0.235	-2,341,089	28
London Hydro	2002-2005	0.969	-0.031	0.383	-639,711	37	1.006	0.006	0.449	121,541	43
Espanola Regional Hydro Distribution	2003-2005	0.972	-0.028	0.197	-22,663	38	0.935	-0.065	0.129	-55,305	29
North Bay Hydro Distribution	2002-2005	0.974	-0.026	0.287	-118,142	39	0.905	-0.095	0.250	-485,664	24
Northern Ontario Wires	2002-2005	0.988	-0.012	0.370	-20,809	40	0.962	-0.038	0.314	-68,554	34
Haldimand County Hydro	2002-2005	0.990	-0.010	0.180	-50,003	41	1.169	0.169	0.084	718,639	67
Welland Hydro-Electric System	2002-2005	1.004	0.004	0.304	14,729	42	1.009	0.009	0.320	33,056	44
COLLUS Power	2002-2005	1.008	0.008	0.384	19,608	43	0.977	-0.023	0.404	-57,254	39
Innisfil Hydro Distribution Systems	2002-2005	1.022	0.022	0.163	53,493	44	0.884	-0.116	0.147	-321,759	21
Sioux Lookout Hydro	2002-2005	1.022	0.022	0.181	17,860	45	0.945	-0.055	0.182	-49,012	32
Woodstock Hydro Services	2002-2005	1.024	0.024	0.403	65,012	46	1.057	0.057	0.313	146,709	50
Clinton Power	2002-2005	1.025	0.025	0.364	8,369	47	1.161	0.161	0.146	48,855	65
PUC Distribution	2002-2005	1.034	0.034	0.188	196,030	48	1.023	0.023	0.250	141,529	45
West Nipissing Energy Services	2002-2005	1.041	0.041	0.311	28,231	49	1.051	0.051	0.311	35,115	49

Table 16, continued

Effects of Cost Performance: Translog & Double Log Models

		Translog Model					Double Log Model				
	Years Benchmarked	Actual/Predicted [A]	Deviation from Sample Mean [A]-1	P-Value	Excess Cost in $	Rank	Actual/Predicted [A]	Deviation from Sample Mean [A]-1	P-Value	Excess Cost in $	Rank
Parry Sound Power	2002-2005	1.042	0.042	0.197	34,146	50	1.061	0.061	0.207	48,700	51
Middlesex Power Distribution	2002-2005	1.043	0.043	0.143	55,658	51	1.076	0.076	0.141	95,266	55
Rideau St. Lawrence Distribution	2002-2005	1.058	0.058	0.290	62,738	52	1.074	0.074	0.259	78,955	54
Grand Valley Energy	2002-2005	1.059	0.059	0.314	9,442	53	1.273	0.273	0.028	36,496	74
Norfolk Power Distribution	2002-2005	1.067	0.067	0.264	240,460	54	1.067	0.067	0.263	240,460	53
Brantford Power	2002-2005	1.076	0.076	0.246	433,404	55	1.102	0.102	0.212	569,121	59
Orillia Power Distribution	2002-2005	1.078	0.078	0.191	189,182	56	1.081	0.081	0.194	198,879	58
Bluewater Power Distribution	2002-2005	1.080	0.080	0.248	523,764	57	1.112	0.112	0.172	710,804	60
Greater Sudbury Hydro	2002-2005	1.083	0.083	0.242	243,158	58	1.063	0.063	0.295	483,001	52
Fort Erie (CNP)	2002-2005	1.083	0.083	0.146	627,525	59	1.050	0.050	0.199	149,442	48
Terrace Bay Superior Wires	2002-2005	1.084	0.084	0.195	21,600	60	1.046	0.046	0.240	12,481	47
Great Lakes Power	2002-2005	1.096	0.096	0.133	540,205	61	1.640	0.640	0.000	2,378,666	83
Newmarket Hydro	2002-2005	1.097	0.097	0.259	453,026	62	1.112	0.112	0.265	513,062	61
Dutton Hydro	2002-2005	1.099	0.099	0.282	13,588	63	1.314	0.314	0.094	36,182	76
Thunder Bay Hydro Electricity Distribution	2002-2005	1.116	0.116	0.139	1,071,135	64	1.076	0.076	0.260	723,913	56
Whitby Hydro Electric	2002, 2003, 2005	1.117	0.117	0.149	690,926	65	1.037	0.037	0.354	238,881	46
Kingston Electricity Distribution	2003-2005	1.137	0.137	0.113	584,554	66	1.134	0.134	0.120	575,912	63
Wellington North Power	2002-2005	1.138	0.138	0.109	102,360	67	1.079	0.079	0.253	61,896	57
Enersource Hydro Mississauga	2002-2004	1.143	0.143	0.116	4,460,773	68	1.200	0.200	0.055	5,918,723	71
Peninsula West Utilities	2002-2005	1.143	0.143	0.227	488,834	69	1.123	0.123	0.217	423,960	62
Centre Wellington Hydro	2002-2005	1.181	0.181	0.111	215,739	70	1.185	0.185	0.091	221,737	69
Westario Power	2002-2005	1.188	0.188	0.082	651,887	71	1.183	0.183	0.099	641,385	68
Eastern Ontario Power (CNP)	2002-2005	1.192	0.192	0.130	177,762	72	1.165	0.165	0.190	155,462	66
Niagara Falls Hydro	2002-2005	1.228	0.228	0.021	1,312,580	73	1.259	0.259	0.016	1,449,386	73
Toronto Hydro-Electric System	2002-2005	1.232	0.232	0.027	26,111,812	74	1.365	0.365	0.003	37,005,031	79
Essex Powerlines	2002-2005	1.259	0.259	0.024	1,138,847	75	1.224	0.224	0.053	1,013,796	72
Veridian Connections	2002-2005	1.280	0.280	0.038	4,341,254	76	1.190	0.190	0.151	3,167,842	70
ENWIN Powerlines	2002-2005	1.292	0.292	0.040	4,529,632	77	1.487	0.487	0.001	6,571,413	82
West Coast Huron Energy	2002-2005	1.301	0.301	0.013	264,103	78	1.405	0.405	0.006	328,077	80
Brant County Power	2002-2005	1.318	0.318	0.024	626,533	79	1.322	0.322	0.024	630,455	77
Tillsonburg Hydro	2002-2005	1.339	0.339	0.079	328,599	80	1.146	0.146	0.177	165,491	64
Chapleau Public Utilities	2002-2005	1.361	0.361	0.009	123,784	81	1.358	0.358	0.008	123,097	78
Midland Power Utility	2002-2005	1.430	0.430	0.018	481,871	82	1.302	0.302	0.026	370,681	75
Erie Thames Powerlines	2002-2005	1.435	0.435	0.002	1,128,102	83	1.428	0.428	0.007	1,115,095	81

The following companies were excluded due to mergers: Asphodel Norwood Distribution, Aurora Hydro Connections, Gravenhurst Hydro Electric, Guelph Hydro Electric Systems (without Wellington Electric Distribution), Hamilton Hydro, Lakefield Distribution, Peterborough Distribution (without Asphodel Norwood and Lakefield), Powerstream (without Aurora), Scugog Hydro Energy, St. Catherines Hydro Utility Services, Veridian Connections (without Gravenhurst Hydro Electric and Scugog), and Wellington Electric Distribution

These companies were excluded from the sample due to missing or inaccurate data: Oshawa, PUC Networks (no retail volumes reported), Hydro One Networks (no deliveries to other LDCs reported), and Atikokan Hydro (zero underground plant reported).

Table 17

Unit Cost and Productivity Indexes for Total OM&A Expenses [1, 2]

	Average OM&A Expenses	Unit Cost (Low Values suggest good cost management.) 2002	2003	2004	2005	Average of Available Years	Average / Group Average [A]	Percentage Differences [A - 1]	Excess Cost Per Year	Productivity (High values suggest good cost management.) 2002	2003	2004	2005	Average of Available Years	Average / Group Average [B]	Percentage Differences [B -1]	Excess Cost Per Year
Unclassified																	
Hydro One Networks	$322,140,448	1.182	1.169	1.113	1.307	1.193	N/A	N/A	**N/A**	0.846	0.866	0.925	0.804	0.860	N/A	N/A	**N/A**
Small Northern LDCs																	
Hearst Power Distribution	$512,184	0.776	0.701	0.857	0.883	0.804	0.634	-36.6%	**-$187,428**	1.242	1.393	1.158	1.147	1.235	1.488	48.8%	**-$249,691**
Lakeland Power Distribution	$1,931,900	0.853	0.973	0.899	0.939	0.916	0.722	-27.8%	**-$536,842**	1.136	1.009	1.111	1.084	1.085	1.307	30.7%	**-$593,093**
Ottawa River Power	$1,854,822	0.965	1.082	1.065	1.034	1.037	0.817	-18.3%	**-$338,669**	0.946	0.855	0.883	0.928	0.903	1.088	8.8%	**-$162,845**
Kenora Hydro Electric	$1,210,292	1.124	1.166	1.188	1.171	1.162	0.917	-8.3%	**-$101,003**	0.872	0.851	0.849	0.879	0.863	1.040	4.0%	**-$47,871**
Sioux Lookout Hydro	$831,596	1.109	0.924	1.297	1.399	1.182	0.932	-6.8%	**-$56,304**	0.865	1.051	0.762	0.721	0.850	1.023	2.3%	**-$19,369**
Espanola Regional Hydro Distribution	$802,114	1.384	1.143	1.070	1.116	1.178	0.929	-7.1%	**-$56,908**	0.696	0.854	0.928	0.907	0.846	1.019	1.9%	**-$15,542**
Northern Ontario Wires	$1,725,352	1.296	1.185	1.280	1.173	1.234	0.973	-2.7%	**-$46,983**	0.753	0.834	0.785	0.874	0.812	0.978	-2.2%	**$38,601**
Fort Frances Power	$911,479	1.209	1.169	1.222	1.303	1.226	0.967	-3.3%	**-$30,455**	0.793	0.831	0.809	0.773	0.802	0.966	-3.4%	**$31,405**
Terrace Bay Superior Wires	$278,342	1.690	1.486	1.382	1.681	1.560	1.230	23.0%	**$64,033**	0.567	0.654	0.715	0.600	0.634	0.764	-23.6%	**$65,819**
Chapleau Public Utilities	$467,979	1.763	1.811	1.619	1.930	1.781	1.404	40.4%	**$189,143**	0.547	0.539	0.613	0.525	0.556	0.669	-33.1%	**$154,689**
Atikokan Hydro	$738,959	1.511	2.581	1.732	1.659	1.870	1.475	47.5%	**$350,961**	0.635	0.377	0.571	0.608	0.547	0.659	-34.1%	**$251,745**
GROUP AVERAGE						*1.268*								*0.830*			
Large Northern LDCs																	
North Bay Hydro Distribution	$4,678,187	1.029	1.063	0.995	0.867	0.989	0.773	-22.7%	**-$1,062,606**	0.913	0.896	0.974	1.139	0.980	1.179	17.9%	**-$837,108**
PUC Distribution	$6,254,896	0.880	0.936	1.089	1.085	0.997	0.780	-22.0%	**-$1,378,448**	1.068	1.017	0.889	0.910	0.971	1.167	16.7%	**-$1,046,056**
Greater Sudbury Hydro	$8,171,498	1.006	0.995	0.980	1.099	1.020	0.797	-20.3%	**-$1,655,383**	0.958	0.981	1.013	0.921	0.968	1.164	16.4%	**-$1,341,231**
Thunder Bay Hydro Electricity Dist.	$10,287,890	1.055	1.094	1.055	1.023	1.057	0.826	-17.4%	**-$1,789,708**	0.909	0.888	0.937	0.985	0.930	1.118	11.8%	**-$1,214,525**
West Nipissing Energy Services	$720,306	1.359	1.250	1.413	1.365	1.347	1.053	5.3%	**$37,956**	0.692	0.762	0.686	0.724	0.716	0.861	-13.9%	**$100,341**
Great Lakes Power	$6,100,416	2.169	2.305	2.168	2.423	2.266	1.771	77.1%	**$4,705,664**	0.433	0.413	0.446	0.407	0.425	0.511	-48.9%	**$2,983,487**
GROUP AVERAGE						*1.279*								*0.832*			
Southwestern Small Town LDCs																	
Grimsby Power	$1,314,250	0.722	0.708	0.799	0.848	0.769	0.677	-32.3%	**-$424,760**	1.392	1.438	1.295	1.245	1.342	1.431	43.1%	**-$566,194**
Niagara-on-the-Lake Hydro	$1,267,288	0.838	0.757	0.851	0.792	0.810	0.712	-28.8%	**-$364,386**	1.145	1.284	1.162	1.274	1.216	1.296	29.6%	**-$375,201**
Halton Hills Hydro	$3,744,491	0.918	0.851	0.863	0.796	0.857	0.754	-24.6%	**-$920,482**	1.102	1.204	1.208	1.335	1.212	1.292	29.2%	**-$1,094,049**
Orangeville Hydro	$1,651,565	0.895	0.964	0.829	0.907	0.899	0.791	-20.9%	**-$345,247**	1.125	1.059	1.252	1.167	1.151	1.227	22.7%	**-$374,498**
Tay Hydro Electric Distribution	$736,780	0.777	0.873	0.972	1.115	0.934	0.822	-17.8%	**-$131,108**	1.283	1.157	1.056	0.939	1.108	1.181	18.1%	**-$133,653**
COLLUS Power	$2,463,634	0.903	0.859	0.919	0.907	0.897	0.790	-21.0%	**-$518,191**	1.049	1.117	1.063	1.097	1.082	1.153	15.3%	**-$376,245**
West Perth Power	$450,079	N/A	1.251	1.224	0.766	1.080	0.951	-4.9%	**-$22,133**	N/A	0.781	0.812	1.323	0.972	1.036	3.6%	**-$16,216**
Norfolk Power Distribution	$3,826,365	1.117	1.073	0.992	0.957	1.035	0.911	-8.9%	**-$341,897**	0.863	0.911	1.001	1.059	0.959	1.022	2.2%	**-$82,806**
Peninsula West Utilities	$3,895,811	1.018	1.019	1.200	1.257	1.124	0.989	-1.1%	**-$43,211**	0.987	0.998	0.862	0.839	0.922	0.982	-1.8%	**$68,705**
Newbury Power	$42,155	N/A	N/A	1.384	0.967	1.175	1.034	3.4%	**$1,446**	N/A	N/A	0.724	1.057	0.891	0.949	-5.1%	**$2,135**
Tillsonburg Hydro	$1,302,458	0.943	1.299	1.169	1.380	1.198	1.054	5.4%	**$70,474**	1.042	0.767	0.866	0.748	0.856	0.912	-8.8%	**$114,482**
Wellington North Power	$847,699	1.107	1.132	1.188	1.251	1.169	1.029	2.9%	**$24,612**	0.870	0.862	0.835	0.809	0.844	0.900	-10.0%	**$84,973**
Midland Power Utility	$1,598,480	1.270	1.254	1.205	1.089	1.204	1.060	6.0%	**$96,072**	0.741	0.761	0.805	0.908	0.804	0.857	-14.3%	**$228,960**
Clinton Power	$354,117	1.131	1.340	N/A	1.341	1.271	1.118	11.8%	**$41,878**	0.860	0.736	N/A	0.762	0.786	0.838	-16.2%	**$57,535**
Brant County Power	$2,603,177	1.120	1.342	1.489	1.301	1.313	1.156	15.6%	**$405,733**	0.861	0.728	0.667	0.779	0.759	0.809	-19.1%	**$498,502**
West Coast Huron Energy	$1,148,015	1.244	1.396	1.373	1.722	1.434	1.262	26.2%	**$300,593**	0.799	0.721	0.746	0.607	0.718	0.766	-23.4%	**$268,982**
Grand Valley Energy	$171,219	1.529	1.468	1.585	1.832	1.604	1.411	41.1%	**$70,456**	0.659	0.695	0.655	0.578	0.647	0.689	-31.1%	**$53,218**
Dutton Hydro	$155,646	1.311	1.436	2.335	1.638	1.680	1.478	47.8%	**$74,477**	0.742	0.686	0.429	0.624	0.620	0.661	-33.9%	**$52,739**
GROUP AVERAGE						*1.136*								*0.938*			

[1] The output index was calculated using the elasticity weights drawn from our translog econometric cost model. The weights were 61.4% for customers, 23.9% for retail volume, and 14.7% for circuit KM of line.

[2] Companies are ranked by the productivity indexes.

Table 17, continued

Unit Cost and Productivity Indexes for Total OM&A Expenses [1, 2]

	Average OM&A Expenses	Unit Cost (Low Values suggest good cost management.)								Productivity (High values suggest good cost management.)							
		2002	2003	2004	2005	Average of Available Years	Average / Group Average [A]	Percentage Differences [A - 1]	Excess Cost Per Year	2002	2003	2004	2005	Average of Available Years	Average / Group Average [B]	Percentage Differences [B -1]	Excess Cost Per Year
Southwestern Midsize town LDCs																	
Chatham-Kent Hydro	$4,698,529	0.705	0.690	0.734	0.727	0.714	0.727	-27.3%	-$1,281,658	1.376	1.424	1.362	1.404	1.391	1.325	32.5%	-$1,525,987
Festival Hydro	$2,954,023	0.824	0.758	0.802	0.762	0.787	0.801	-19.9%	-$587,022	1.170	1.289	1.239	1.330	1.257	1.197	19.7%	-$580,796
Wasaga Distribution	$1,292,945	0.724	0.775	0.844	0.930	0.818	0.833	-16.7%	-$215,311	1.375	1.303	1.215	1.125	1.255	1.194	19.4%	-$251,451
Port Colborne (CNP)	$1,447,646	0.699	0.873	0.853	N/A	0.808	0.823	-17.7%	-$255,948	1.373	1.114	1.159	N/A	1.215	1.157	15.7%	-$227,068
Innisfil Hydro Distribution Systems	$2,465,220	0.861	0.884	0.975	0.977	0.924	0.941	-5.9%	-$144,626	1.157	1.141	1.053	1.071	1.106	1.053	5.3%	-$129,486
E.L.K. Energy	$1,679,279	0.935	1.029	0.879	N/A	0.948	0.965	-3.5%	-$58,328	1.098	1.011	1.204	N/A	1.104	1.051	5.1%	-$86,078
St. Thomas Energy	$2,549,829	0.813	0.868	0.941	1.009	0.908	0.924	-7.6%	-$192,956	1.196	1.135	1.065	1.013	1.102	1.050	5.0%	-$126,308
Bluewater Power Distribution	$7,072,941	0.944	1.001	0.925	0.942	0.953	0.971	-2.9%	-$206,701	1.044	0.998	1.098	1.100	1.060	1.009	0.9%	-$65,046
Woodstock Hydro Services	$2,746,297	0.919	0.943	1.021	1.034	0.979	0.997	-0.3%	-$7,819	1.069	1.056	0.992	0.999	1.029	0.980	-2.0%	$56,113
Orillia Power Distribution	$2,629,754	0.916	1.050	1.089	1.169	1.056	1.076	7.6%	$198,599	1.087	0.961	0.942	0.895	0.971	0.925	-7.5%	$197,470
Fort Erie (CNP)	$3,148,520	1.231	0.900	1.091	0.984	1.052	1.071	7.1%	$223,379	0.780	1.080	0.906	1.024	0.948	0.902	-9.8%	$308,217
Middlesex Power Distribution	$1,359,979	1.070	1.124	0.915	1.175	1.071	1.091	9.1%	$123,509	0.907	0.874	1.093	0.868	0.936	0.891	-10.9%	$148,682
Essex Powerlines	$5,561,232	1.141	1.025	1.133	1.247	1.137	1.158	15.8%	$876,645	0.900	1.015	0.934	0.865	0.928	0.884	-11.6%	$645,797
Haldimand County Hydro	$4,978,903	1.088	1.042	1.122	1.153	1.101	1.121	12.1%	$604,083	0.886	0.938	0.886	0.879	0.897	0.854	-14.6%	$726,213
Westario Power	$4,157,664	1.003	1.117	1.120	N/A	1.080	1.100	10.0%	$416,244	0.927	0.843	0.855	N/A	0.875	0.833	-16.7%	$694,147
Erie Thames Powerlines	$3,755,379	1.157	1.333	1.479	1.529	1.374	1.400	40.0%	$1,500,691	0.841	0.739	0.677	0.668	0.732	0.696	-30.4%	$1,139,980
GROUP AVERAGE						*0.982*								*1.050*			
Eastern LDCs																	
Hydro Hawkesbury	$656,384	0.596	0.630	0.570	0.687	0.621	0.636	-36.4%	-$238,969	1.566	1.500	1.684	1.426	1.544	1.443	44.3%	-$290,935
Hydro 2000	$170,263	0.578	0.678	0.659	1.230	0.786	0.805	-19.5%	-$33,173	1.614	1.394	1.459	0.797	1.316	1.230	23.0%	-$39,171
Lakefront Utilities	$1,307,426	0.711	0.678	0.808	0.971	0.792	0.811	-18.9%	-$246,706	1.358	1.443	1.232	1.045	1.270	1.186	18.6%	-$243,810
Peterborough Distribution	$5,103,207	0.835	0.781	0.814	0.831	0.815	0.835	-16.5%	-$840,314	1.132	1.226	1.196	1.195	1.187	1.109	10.9%	-$557,701
Cooperative Hydro Embrun	$302,333	0.993	1.079	0.974	1.151	1.049	1.075	7.5%	$22,653	1.023	0.954	1.074	0.927	0.995	0.929	-7.1%	$21,318
Renfrew Hydro	$719,735	0.967	0.947	0.949	0.906	0.942	0.965	-3.5%	-$25,028	0.944	0.977	0.992	1.059	0.993	0.928	-7.2%	$51,852
Kingston Electricity Distribution	$4,903,757	0.982	0.962	0.992	0.999	0.984	1.008	0.8%	$37,745	0.965	0.998	0.983	0.997	0.986	0.921	-7.9%	$386,326
Rideau St. Lawrence Distribution	$1,152,996	1.054	1.114	1.130	1.109	1.102	1.129	12.9%	$148,327	0.912	0.874	0.876	0.910	0.893	0.834	-16.6%	$190,866
Parry Sound Power	$856,835	1.037	1.138	1.302	1.365	1.210	1.240	24.0%	$205,328	0.945	0.873	0.775	0.755	0.837	0.782	-21.8%	$186,491
Eastern Ontario Power (CNP)	$1,100,647	N/A	1.632	1.216	1.534	1.461	1.496	49.6%	$546,063	N/A	0.588	0.803	0.649	0.680	0.635	-36.5%	$401,229
GROUP AVERAGE						*0.976*								*1.070*			
Large City Southern LDCs																	
Hydro One Brampton Networks	$13,370,715	0.629	0.609	0.544	0.587	0.592	0.704	-29.6%	-$3,954,232	1.618	1.694	1.930	1.823	1.766	1.368	36.8%	-$4,916,642
Hydro Ottawa	$37,805,068	0.852	0.698	0.634	0.625	0.702	0.834	-16.6%	-$6,259,186	1.193	1.475	1.652	1.709	1.507	1.167	16.7%	-$6,318,605
Powerstream	$33,730,504	0.644	0.733	0.780	0.818	0.744	0.884	-11.6%	-$3,901,481	1.581	1.408	1.345	1.308	1.411	1.092	9.2%	-$3,113,947
Horizon Utilities	$31,469,808	0.654	0.729	0.735	0.829	0.737	0.876	-12.4%	-$3,905,639	1.537	1.395	1.408	1.273	1.403	1.087	8.7%	-$2,724,183
London Hydro	$20,321,872	0.773	0.757	0.785	0.782	0.774	0.921	-7.9%	-$1,613,649	1.259	1.302	1.276	1.306	1.286	0.996	-0.4%	$91,428
Enersource Hydro Mississauga	$35,667,848	0.810	0.833	0.887	0.924	0.864	1.027	2.7%	$955,497	1.257	1.239	1.184	1.158	1.209	0.936	-6.4%	$2,270,048
Toronto Hydro-Electric System	$138,488,976	0.869	0.928	0.946	0.898	0.910	1.082	8.2%	$11,377,729	1.172	1.112	1.109	1.192	1.146	0.888	-11.2%	$15,556,149
Veridian Connections	$19,922,136	1.022	1.233	1.000	0.889	1.036	1.232	23.2%	$4,618,033	0.998	0.838	1.051	1.206	1.023	0.792	-20.8%	$4,135,764
ENWIN Powerlines	$20,080,970	1.265	1.239	1.228	1.112	1.211	1.440	44.0%	$8,830,250	0.812	0.840	0.861	0.970	0.871	0.674	-32.6%	$6,539,766
GROUP AVERAGE						*0.841*								*1.291*			
GTA towns LDCs																	
Kitchener-Wilmot Hydro	$9,351,437	0.594	0.610	0.608	0.619	0.608	0.699	-30.1%	-$2,816,163	1.673	1.653	1.685	1.688	1.674	1.383	38.3%	-$3,584,171
Barrie Hydro Distribution	$7,813,820	0.607	0.749	0.655	0.559	0.643	0.739	-26.1%	-$2,040,601	1.641	1.348	1.566	1.874	1.607	1.328	32.8%	-$2,559,109
Cambridge and North Dumfries Hydro	$7,104,172	0.711	0.698	0.760	0.706	0.719	0.826	-17.4%	-$1,233,504	1.398	1.443	1.348	1.481	1.417	1.171	17.1%	-$1,214,983
Burlington Hydro	$9,539,784	0.751	0.778	0.823	0.824	0.794	0.913	-8.7%	-$828,373	1.338	1.308	1.256	1.280	1.296	1.070	7.0%	-$671,762
Oakville Hydro Electricity Distribution	$9,223,560	0.784	0.880	0.827	0.798	0.822	0.945	-5.5%	-$503,719	1.291	1.165	1.261	1.331	1.262	1.042	4.2%	-$391,637
Guelph Hydro Electric Systems	$7,535,517	0.801	0.817	0.775	0.808	0.800	0.920	-8.0%	-$600,090	1.224	1.216	1.304	1.276	1.255	1.037	3.7%	-$277,380
Waterloo North Hydro	$8,171,374	0.863	0.846	0.848	0.801	0.839	0.965	-3.5%	-$283,320	1.152	1.190	1.208	1.305	1.214	1.003	0.3%	-$22,253
Milton Hydro Distribution	$3,572,770	0.958	0.889	0.849	0.870	0.891	1.025	2.5%	$89,066	1.049	1.145	1.219	1.213	1.156	0.955	-4.5%	$159,426
Whitby Hydro Electric	$6,584,501	0.949	1.025	0.918	0.950	0.960	1.104	10.4%	$685,235	1.076	1.009	1.145	1.129	1.090	0.900	-10.0%	$656,917
Welland Hydro-Electric System	$3,693,122	0.858	0.939	0.961	0.862	0.905	1.041	4.1%	$150,503	1.119	1.035	1.028	1.170	1.088	0.899	-10.1%	$373,639
Brantford Power	$6,180,431	0.841	0.923	1.001	0.982	0.937	1.078	7.8%	$479,152	1.146	1.058	0.992	1.031	1.057	0.873	-12.7%	$783,669
Newmarket Hydro	$5,165,882	0.916	1.327	0.926	0.866	1.009	1.160	16.0%	$825,951	1.100	0.769	1.121	1.223	1.053	0.870	-13.0%	$671,072
Niagara Falls Hydro	$7,093,752	1.026	1.035	1.048	1.106	1.054	1.212	21.2%	$1,503,067	0.935	0.939	0.944	0.911	0.932	0.770	-23.0%	$1,630,269
Centre Wellington Hydro	$1,420,028	1.295	1.214	1.151	1.114	1.194	1.373	37.3%	$529,154	0.758	0.818	0.878	0.925	0.845	0.698	-30.2%	$429,044
GROUP AVERAGE						*0.870*								*1.210*			

[1]The output index was calculated using the elasticity weights drawn from our translog econometric cost model. The weights were 61.4% for customers, 23.9% for retail volume, and 14.7% for circuit KM of line.
[2]Companies are ranked by the productivity indexes.
[3]Low values suggest good cost management
[4]High values suggest good cost management

Estimation Consumer Dividend (Con’t)

Econometric and unit cost estimates will then be used to divide industry into five groups

Group I:	Significantly superior cost performers
Group II:	Top third on OM&A index but not statistically significant cost performers
Group III:	Middle third on OM&A index, statistically average cost performers
Group IV:	Lower third on OM&A index, not statistically inferior cost performers
Group V:	Statistically inferior cost performers

Pacific Economics Group, LLC
Economic and Litigation Consulting

Estimation Consumer Dividend (Con't)

Benchmarking evaluations then used to assign consumer dividend to all distributors in a group

Group	Consumer Dividend
I	0
II	0.15%
III	0.30%
IV	0.45%
V	0.60%

Dividend values based on judgment, but are "scaled" to be consistent with approved precedents

Pacific Economics Group, LLC
Economic and Litigation Consulting

Recommendations

Overall recommendation

- Single industry TFP trend based on US TFP data trend = 0.88%
- Five consumer dividends between 0 and 0.6% based on Ontario benchmarking data
- Average X factor probably about 1.15%

  >> less than X for all distributors in IRM1

  >> somewhat greater than current X=1%, although X factor will decline for significantly superior cost performers

Future IR applications can put more weight on:

- Index-based Ontario TFP trends
- Total cost benchmarking for Ontario industry

Pacific Economics Group, LLC
Economic and Litigation Consulting